

EOS 299

**TOMATOES, MUSHROOMS
AND OTHER CHOICE FOODCROPS**

BY THE SAME AUTHOR



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HORTICULTURAL ABSTRACTS.



ADAM & CHARLES BLACK

TOMATOES MUSHROOMS

& OTHER CHOICE FOODCROPS

BY

GEORGE E. WHITEHEAD

ADAM & CHARLES BLACK

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**THIS BOOK IS PRODUCED IN COMPLETE CONFORMITY
WITH THE AUTHORIZED ECONOMY STANDARDS**

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INTRODUCTION

MY previous books dealt with various vegetables, fruits and herbs, in the simplest terms. In them I endeavoured to describe the essential treatments for each subject without including a lot of finicky details. The following pages are the continuation of the same theme—garden food production. To my mind this book is more interesting than the others, because it is about crops that increase the zest for living. Some of the delicacies need a little more than the usual care and some of them need certain facilities, but none of them are beyond the limits of the ordinary garden enthusiast. It has been necessary to give more than brief details about them, but, even so, none demand complicated processes.

Just as there are many ways to cultivate vegetables and fruits, so there are many ways in which to write about them. It is possible to compile ignorant eulogies, or collect and rearrange information, but I have written this simple exposition during breaks from the actual task of growing the things without any references other than the notes in my diary. Although there are hazards in doing it this way, there are advantages. It is possible that some details may have been overlooked. It is certain that nothing is included that is not authentic.

The reader may notice that ancient and modern forms of cultivation are terribly mixed together. For example, my treatment of the manure for mushrooms is the same as that of our forefathers who knew nothing about pure culture spawn, and the use of pure loam for some of the crops has been the rule for ages, whereas the John Innes scientific composts were evolved only a few years ago. As a practical gardener, I seriously believe that a combination of old practices with the application of new scientific discoveries is more conducive to good results than a bias, one way or the other. In any case, I should like to express my humble gratitude to the exponents and students of our craft from whom I have learned this knowledge in the school of experience.

Extracts from articles that have appeared in *The West Sussex County Times* and *Good Housekeeping* are included in this work. The kindness of the respective Editors is gladly acknowledged.

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I. TOMATOES

THE beginning of this book is being written in a corridor leading to several greenhouses that contain tomato plants in various stages of development. Tomatoes have been grown in this range for several years. Some of the crops have been better than those I see at the moment, and some have been definitely disappointing. Some have come and gone without afflictions, whilst others have been smitten by all sorts of diseases and attacked by all sorts of insects. I have learned that there is only one drastic way to counter the main troubles and difficulties that confront the modern tomato grower. Of course, such things as "White Fly" and "Blossom End Rot," and similar troubles are likely to appear in the best regulated nurseries, but many of them are less likely if the cultivation of this fruit is carried out by the most efficacious methods.

"Beginner's luck" generally comes to everyone, but the snag of continuous cultivation is that results get worse and worse unless it is realised that fresh or refreshed soil must be provided every year. Soil is the key to constant success. Tomatoes, when in good health, yield more fruits in weight than any other crops and these fruits contain minerals that have been

taken from the soil. Large-scale growers have tried to overcome soil-exhaustion by elaborate sterilisation processes combined with the addition of fertilisers, but they seldom meet with the same degree of success as those who tackle the laborious job of exchanging soil after every crop.

A description of my own and other systems of soil management may be helpful in promoting ideas in overcoming this major problem. I combine the growing of mushrooms, forced carrots, lettuces, radishes and onions in a scheme of soil economics. Pasture loam is bought a year before it is wanted. It is stacked into a neat pile, and while being stacked, is freely sprinkled with hydrated lime. In late autumn, after the old tomato haulms have been cleared away and burnt, the spent soil is wheeled out of the houses and either used upon the tops of hotbeds upon which carrots and lettuces will be grown in the spring, or added to that part of the garden that is to bear a crop of onions during the ensuing spring and summer. After the greenhouses have been thoroughly cleaned and scrubbed with water containing disinfectant, this imported soil is carried in and prepared for the next crop.

Before the procedure is described, I must state that I know that it is impossible to expect many people to have one-year-old turf in readiness, and it means using fresh stuff instead. If it does not contain too many wireworms and other pests, there is no reason

why it should not be used just as it is, but if there is a doubt about that, the wisest course, if it can be managed, is to sterilise the bulk before placing it in the beds. There are several methods of doing that, some of which are impracticable simply because they demand exceptional facilities. For instance, there are utensils, impossible to obtain now, that consist of a stokehole, boiler and container that will sterilise by steam 20 gallons of soil in one hour. There are portable affairs that will treat 5 cubic feet in two hours.. There are fixed plants that look like steam engines and will deal with soil by the ton.

Another method of sterilisation is to steep the soil in a solution of some sort or other. Most of the solutions are proprietary brands and full instructions are issued with the basic liquids. In one, for example, one part of the basic liquid is mixed with 500 parts of water and the soil is thoroughly soaked with it. One well-known steriliser is Formaldehyde, that is mixed with 50 times its quantity of water, $1\frac{1}{2}$ gallons of the base being enough to treat a ton of soil in a lump. The lump is well wetted and then covered with sacks to keep in the fumes. After forty-eight hours the sacks are removed. After three weeks the soil may be used.

Those methods are useful for large quantities of soil. Undoubtedly the best procedure is to sterilise all loam if it can be managed, but I confess that I do not treat the loam that has stood in a heap for a year

and was limed at the time it was stacked. If there are wireworms in that stack, they are dealt with in the greenhouse later.

GREENHOUSE BEDS

If possible, tomatoes should be grown in beds rather than large pots. These beds can be put upon the floor or they can be stacked upon staging, the only disadvantage of the latter being the lack of height between soil surface and glass. With beds upon the floor it is possible to have plants several feet high that bear seven or eight trusses of fruit.

There must be drainage. I generally like to build up the beds so that there is a wall of soil that gives natural drainage rather than have a system of clinkers over drain pipes and all that sort of thing. The best crops of my tomatoes come regularly from a bed that is laid upon a flat concrete floor. This bed is about 12 ft. long and 3 ft. wide. It is made about 1 ft. high and consists of nothing more than lumps of turf and a small addition of rotted mushroom manure and a little proprietary fertiliser. The largest lumps are laid round the outside to form a wall, much as a bricklayer uses bricks for his purpose. The turves, being about 3 in. thick, are laid one on another to form a wall to the requisite height. The middle of the bed is filled with chopped-up loam to which has been added the old mushroom manure and the fertiliser. A pound of fertiliser is enough for the

whole bed and the proportion of rotted manure is one part manure to six parts loam. The bed is built during the New Year so that it can settle down before planting-time and so that wireworms can be caught. I also raise some early lettuces of the Cheshunt Early type and plant these upon the bed immediately after it is constructed so that they can be cleared when the tomato plants want the room.

Whether beds of that sort are made, or large pots are used, that mixture is seldom varied for it is fairly safe and reliable. One of the problems is to get the loam. I have gardened in five counties and have always found what I wanted. The most helpful people in putting me on the track have been reputable gardeners, local nurserymen and horticultural sundriesmen. It is well to make inquiries of all of them and then use common sense.

For those who cannot get mushroom manure or its equivalent, and for those who would like to try something that is less hazardous than my own soil recipe, the standard compost of the John Innes Institution is foolproof. It consists of seven parts peat and two parts sand. To every cubic yard of this is added 5 lb. of what is known as "J. I. Base" and 1 lb. of ground chalk, or any sort of lime that is not hydrated. The J. I. Base is a mixture made of two parts hoof and horn manure, two parts superphosphate of lime and one part sulphate of potash. The loam is just the same as I use, but it has been cut from the pasture

one year and stacked to partially rot without being limed. It is then sterilised by steam. The peat, sand and fertilisers are not sterilised, but are added afterwards. I would say that if tomatoes are grown in pots instead of in beds that this compost is preferable, because it is free of weeds and insects (the sterilisation does that), but it is a laborious business preparing sufficient bulk for large beds.

Although it is possible that such a compost can be used for two or more consecutive crops of tomatoes, I am convinced that most of the diseases are due to tired soil and I would rather exchange soil every year than take chances, no matter how efficient the sterilisation process. It is possible that the exact materials for the J. I. Base are unobtainable now, but a good proprietary tomato fertiliser will be a good substitute. Anyway, those who are interested in composts are advised to send to the John Innes Institution, 31 Mostyn Road, London, S.W.19, for the leaflet dealing with the subject. It costs sixpence.

If anyone is not prepared to study soil, it is little use continually trying to grow indoor tomatoes. That is why my first few pages are deliberately devoted to this vital subject. It is not too difficult if tackled wholeheartedly.

SEEDLING RAISING

Whether tomatoes are to be grown outdoors, or complete their lives under glass, they must be raised

from seed that is germinated in a heated structure. Unless we want to have fruits in unusual seasons, which means that we must practise unusual forms of cultivation, we sow the indoor crops in early January. Those to be transferred to the open garden are generally started about the end of February. In addition to these two main sowings, I also sow some more in April to yield crops indoors during autumn and early winter. These are sown in a cold greenhouse and heat is given when the fruit is ripening, which is the exact opposite to that needed for normal cultivation—January and February sowings.

For seed-sowing purposes, I use the John Innes Seed Compost and follow the instructions to the letter. Old loam is sterilised in a small steam apparatus. (Boiling water poured over the soil is a makeshift for a small quantity.) It is riddled through a fairly fine sieve first. After that, some peat and coarse horticultural sand is added, the proportion being two parts loam, one part peat and one part sand. To each bushel of the mixture is added $1\frac{1}{2}$ oz. of superphosphate of lime and $\frac{3}{4}$ oz. of fine chalk. All are mixed together and the compost is ready when it is damp, but not clammy.

Incidentally, this seed compost is ideal for nearly everything that is raised from seed in the greenhouse.

I use ordinary flat seed-pans in which to sow seeds. Pots are too deep but they will do, so will shallow boxes, but pans are handiest. Crocks are placed over

the drainage holes and some rough leaves or pieces of peat are laid over the crocks. Compost is then put into the pans and pressed down with the knuckles until it gets to within $\frac{3}{4}$ in. of the rim. The surface is flattened down smoothly and then a little compost is sifted over the surface to give a tilthy top. On this the seeds are sown, being spaced about $\frac{1}{2}$ in. apart in all directions. After that, some more compost is shaken through the sieve to cover them with about a $\frac{1}{4}$ -in. layer. This is pressed down lightly before the label is placed in the side of the pan. When all the pans are sown, each is dipped in a bucket of tepid water so that moisture oozes up through the drainage holes. When dampness appears on the surface, each pot is lifted out of the bucket and allowed to drain.

The pans are stood upon the bench in the greenhouse and are covered with sheets of brown paper. Sheets of glass can also be laid over the pans and under the paper, but it is not essential. If they are, they must be turned over every day, or the condensed moisture upon them will cause trouble. If a temperature of from 50° to 60° Fahr. is maintained, the seedlings will appear after a few days. Remove the paper and glass and give them as much light as possible. We like to put them on a shelf near the apex of the roof where they get warmth and light. They are watered carefully and kept upon the "dry side," rather than given much moisture.

VARIETIES

There are hundreds of varieties. Some are better than others but very few are very bad. Well-known standard sorts like Potentate are preferable to risky novelties, but there are bad and good strains of every sort and it is well to obtain them from a first-class seedsman. We generally save a few fruits from the best plants and find them superior to those we buy, but we always buy some as well, just to make doubly sure of obtaining good crops, and we grow several sorts, for we find that varieties vary from year to year.

POTTING SEEDLINGS

When the seedlings are a few inches high, and are just beginning to jostle each other, we pot them off singly into small pots known as "small sixties." The compost is the same as for the seed and is prepared in the same way. Each pot is crocked and a little peat is placed over the crocks before some compost is put in. Then seedlings are dug out of the seed-pans carefully and planted in the pots, the compost being pressed around their roots carefully and moderately firmly. Care is taken to see that the fingers press down upon the roots and not towards the necks of the plants, for ignorant or careless potters damage the necks of seedlings by squeezing them. Seedlings should be planted just a little deeper than they were in the seed-pan. The surface of the compost in the small pots should be flat when potting

is properly done. After potting, the seedlings are placed fairly close together upon the staging of the greenhouse and little or no ventilation is given for a few days, nor are they watered if the compost was moist at potting-time. If the greenhouse has a dry atmosphere, they are sprinkled lightly with water dipped out of the greenhouse tank, but this sprinkling business must not be overdone. After a few days when the plants show signs of growing again, they are removed to their top shelf and are watered when considered necessary. They are out of the way up there, but they must not be forgotten. It pays to look round them twice daily and water those that obviously want it, but pass those by that do not want it.

VENTILATION

The more quickly the plants grow the more ventilation should be given them. If they grow too quickly, they get spindly and thin and they will never bear as freely as when they remain sturdy. The truth is, that tomatoes like plenty of air at all times except immediately after the roots have been disturbed. A nice comfortable atmosphere suits them much better than stuffiness. On the other hand, a cold draught in spring should be avoided. The ventilator that will give the least draught should be opened. If you can give tomatoes the same sort of conditions that the average human being prefers at all times,

you will be right. That is as safe a guide as anything. It is better than striving to maintain a thermometer temperature. For instance, we leave the ventilators open day and night during nice weather in summer just when we prefer to sleep with the windows wide open.

HEAT AND WATER

Heat, like ventilation, should be given to tomatoes when they want it. The same thing can be said about heat that has already been said about ventilation. A normal person knows when to turn off the central heating in the spring and it is time to turn off the greenhouse pipes too, if the tomatoes are the things that matter (just as babies need a little more warmth than adults, so do young tomato plants need that little more than the developed plants).

Water should be given sparingly when plants are young and freely when they develop. We find it necessary to give them gallons every day in summer, but a few pints will suffice in early spring. During late spring and summer we "have a look at them" in the morning, at noon and in the evening.

REPOTTING

Those plants that are to be grown in beds are planted straight from the small pots into them during late March or early April. Sometimes it is inconvenient to do so because of a crop of lettuces growing

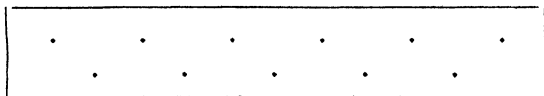
upon the beds and then the plants are repotted from the "sixties" into 5-inch sizes. The same compost is used for repotting as for seed-boxes, except that it is not sieved so finely before it is sterilised. In fact, we often abandon the latter process at this stage, although there is no doubt that it is advantageous when there is time to do it. Those plants that are to be fruited in large pots should definitely be repotted into the 5-inch size and grown in them until they almost become root-bound and are ready for the 8- or 10-inch size.

SUPPORTS

Tomato plants need supports from an early age. While in the small pots, there is nothing to beat thin bamboo canes. These can be inserted in the soil in the pots and little damage is done to the roots. In larger pots, larger bamboos will do. The extra depth to the pots will give sufficient stabilisation at the basal end. Tomatoes grown in shallow beds are a more difficult proposition in this direction, the soil not being deep enough to hold the canes firmly. We must remember that a vigorous tomato plant will grow 5 ft. or 6 ft. high and will bear several pounds of tomatoes, therefore, the supporting cane or stake must be inserted firmly, or be held steadily at its top end. I generally arrange an overhead system of horizontal wires that are stretched from end to end of the greenhouse walls, and to which the top of each

cane is tied firmly. With its bottom end inserted in the bed and its tip secured to wire, it will never become a nuisance when the weight of the crop depends upon its sturdiness.

Canes, or stakes, are inserted in the beds before the plants are introduced from the pots. As far as practicable, I like to space the canes about 2 ft. apart in all directions. In that bed that was mentioned earlier and measures 12 ft. by 3 ft., eleven plants are grown and the canes are inserted in two rows in criss-cross manner :



It is a good way to arrange tomato plants, no matter where they are, and the criss-cross system can be modified in all sorts of situations, whether in the greenhouse or outdoors. The canes need not be strictly upright as long as they are firm. In fact, in one house I slope them over the path to form an arch that reaches to the apex of the roof and suggests those arches of swords that happy couples walk under at military weddings. One's personal ingenuity can have full play in this sort of thing.

Once the canes are firmly fixed, the next job is to insert the plants. They are tipped out of their pots carefully and the crocks at the bottom of the earth balls are removed. The surface of the balls of soil

containing the roots is slightly broken before they are planted in the bed, one in front of each cane. The roots are put in slightly deeper than they were in the pots. In other words, the ball of soil is just covered with the surface of the bed when the job is complete. It should not be necessary to state that they should be planted fairly firmly.

DISBUDDING

If watered only when considered necessary, and ventilated within reason, taking note of the weather, they will soon grow and begin to form sideshoots that spring from the axils of the leaves. If left to their own devices the plants will grow into bushes instead of one-stem vines. In that way they seldom bear good crops, and so we must train them to grow one upright stem. Every sideshoot appearing in the axil of every leaf must be picked out between thumb and finger directly it is seen. This must be a routine job and be a part of a combined operation of tying in the main stem to the cane or other support at the same time. Be careful to distinguish the leading tip or shoot from the shoots that emanate from the axils of the leaves and save that untouched, for if that is nipped off along with the rest, the plant will be unable to grow any higher. This part of the business is an important one and I ought to write a lot more about it in order to stress its significance, but the fact remains that there is no more to do than pinch

out every sideshoot that grows from a leaf axil directly it is seen. Harm is often done by neglecting to make this a routine job, for if several long sideshoots are allowed to develop, and then are dealt with in one foul swoop, the crop is impaired.

Ordinary raffia is as good as anything to secure the main stems of the plants to the supports. It should be tied to the cane first and then looped rather loosely round the stem before its ends are tied together to form a loose collar. The stems will swell considerably as they develop and a tight tie will cause graining. Anyway, this business of removing sideshoots and tying in the main stem should be attended to twice weekly.

POLLINATION

Tomato plants are not very large before the first trusses of blossom arrive. They do not come from the axils of leaves, therefore they are easily distinguished from the rest. On no account remove any of these. The first trusses seldom develop into satisfactory bunches of fruits, although they often do bear several good fruits when fertilised. The second, third and fourth trusses are most often the ones that produce the most satisfactory quantities of the right-sized tomatoes.

Fertilisation is not a major problem in tomato growing, but, as I have already indicated, the first trusses often misfire because of lack of it. It can be

brought about by simply rapping the supporting canes upon several days while the first flowers are fully open. You go into the house at midday and strike each cane sharply so that the plant is shaken and its pollen is dispersed, causing it to settle upon the female organs. You will hardly notice the pollen and there is no need to worry about that providing you repeat the daily performance several times. After that, there is no need to worry about this business either, for mature plants seemingly fertilise themselves without any aid.

If flowers do not "set" through that treatment, the conditions are wrong somewhere. Maybe the roots are too dry below the surface, or the atmosphere of the house is too dry, or the temperature of the house is too erratic. We get cold nights and hot sunny days in May. The obvious way to keep the houses warm at night is to close the ventilators. The way to stop the temperature from rising too quickly when the sun shines is to open the top ventilators directly the thermometer rises and then to damp the pathways, and even spray the foliage with water that is the same temperature as the house. This should be done just when the sun begins to make its warmth apparent in the house. Further dampings of the house may be made during the days when the sun is specially hot, but do not sprinkle the leaves when there is a piercing warmth. Do not sprinkle water around when the heat begins to wane, but close the

ventilators when the air is buoyant. In other words, a happy temperature and not-too-dry or too damp an atmosphere all the while saves a lot of such troubles as flowers dropping and fruits arriving that never get larger than marbles. The right compost, that must contain humus (mushroom bed manure or peat), keeps the moisture at the roots steady and gives steady growth. If the soil is too light, such as when ordinary garden soil and leaf mould are mixed together, and water is given too freely, rank growth is the result, and the same sort of troubles come about.

When plants get past the pollination trouble, the next one may be Blossom End Rot. This is easily distinguished because the part of the fruit farthest away from the stalk goes black and withered in a definite manner. It occurs most often upon the first two trusses and is due to a functional disorder of some kind or another. The scientists assure us that it is not a disease, but is due to too much dryness at the roots. I have found out that it appears in damp beds quite as much as in dry ones, but I have noticed that it generally comes upon plants that have drooped through dryness while in their small pots. Therefore, Blossom End Rot can be due to previous neglect, rather than to the treatment being given when it appears. It disappears when the plants get older and there is no more to do than pick off and destroy the affected fruits directly they are noticed.

The next problem will be feeding. Tomatoes like

plenty of potash and seldom ripen satisfactorily unless they get it. Rather than risk getting hold of the wrong sort of crude fertiliser, I prefer to obtain a canister or bag of a reliable proprietary brand and apply it according to directions. I like to feed once weekly while the tomatoes are forming, rather than dose them with an excessive quantity all at once. I find that those liquid manures sold in bottles like the old Parrishes Food of the children's nursery are excellent alternatives, and if these are used alternately with a proprietary tomato food the outcome is satisfactory. Treated that way, a healthy plant will yield pounds of fruits upon several trusses.

Incidentally, those plants grown in large pots will seldom yield as many fruits as those grown in beds and it is a good plan to nip off the top shoot as well as the sideshoots when the plants have produced five flower trusses. This causes them to pass the remainder of their days in swelling the fruits upon those trusses instead of striving to form more trusses. Once the top shoot is pinched out, no more leaves can be produced.

Some people make a fetish of removing some of the existing foliage too, but it is wrong. There is no need to worry about that.

" WHITE FLY "

A greenhouse pest that is likely to appear in summer because it is especially partial to tomatoes, is known

as the " White Fly." There is no possible reason for not identifying it. It is pure white and is about as large as a pin's head and flutters around when an infected plant is shaken. It increases with amazing haste and makes the plants sticky and messy in a short while. It cannot be killed by ordinary sprays, or fumigants, but a special " White Fly Fume " must be obtained and used according to directions. Once this pest is established, it is necessary to fumigate several times before it can be eradicated. The fumes do not kill the successive generations of eggs. Another patent antidote is Cyanogas, that is deadly to the pest and dangerous to human beings who use it carelessly. Still a third method of control is to introduce Chalcid Wasps. These are parasitical insects that attack the flies ravenously and they are obtained from research stations when supplies are available.

WIREWORMS

Wireworms are prevalent in pasture loam and they can do a lot of damage to tomato plants. They burrow into the roots and enter the base of the stems. After a short while, the plant will collapse and an inspection of the stem just below surface level will either reveal the culprit or where it has been. Sterilised soil is the surest preventative. However, I do not use sterilised soil and I trap the wireworms beforehand. Immediately after the beds are made in the New Year, some pieces of carrot and potatoes are

buried about an inch deep in the soil. Each piece is stuck on a skewer, like a toffee-apple, so that I can see where it is buried. It is lifted out every second or third day and examined before being replaced. Any adhering wireworms are promptly destroyed.

"DAMPING OFF"

Seedlings are apt to rot off at the base if they are sown in unsterilised soil and are kept too damp, or are sown too thickly. Once the fungus gets into a seed-pan, the results are disastrous. Happily, we can prevent it by dosing the soil with a concoction known as "Cheshunt Compound." As other seedlings, including such things as antirrhinums, are likely to be attacked by this bother, it is worth while giving the recipe here.

Two parts of fine copper sulphate should be mixed with eleven parts of fresh ammonium carbonate by putting both ingredients (finely ground) into a bottle and shaking it well. Make the bottle air-tight and allow it twenty-four hours to react. When wanted, dissolve one ounce of it in a little hot water and then add soft water to make a bulk of two gallons. If possible, use a painted or earthenware receptacle. Pour it on to the seed-pan when the seedlings are a few days old. I generally take the recipe along to the chemist and ask him to prepare it in the bottle. That ensures me getting finely ground ingredients.

VIRUS DISEASES

The tomato is likely to be attacked by all sorts of virus diseases during its brief lifetime. Some of them are very serious. These are generally seen on the leaves that go yellow in patches or are mottled (mosaic). When noticed, the best way to deal with badly afflicted plants is to uproot them carefully so that they cannot transmit their complaint to their neighbours. One disease of this nature is said to be spread by smoking cigarettes while working among them, and the use of nicotine insecticides should be avoided. In any case, it can be taken for granted that the mysterious diseases like leaf-blistering and wilting are carried from plant to plant by some agent or other and the grower is often the culprit. Care should be taken to cleanse the hands after handling diseased plants and to avoid letting one's clothing brush up against the foliage. In other cases, certain insects spread the diseases and the moral is obvious.

I am inclined to think that these diseases are seasonal too. They come in mild muggy weather, or during cool spells after hot weather. When the sun shines again they recede and what looked to be an ominous outlook turns out to be a success after all. However, you can't be too careful.

One of the unsuspecting causes of diseases starting afresh in sterilised greenhouses is using infected canes. These canes are collected together at the end of the

season and stored away till next summer without being treated in any way. The best treatment is to dip them in a Formaldehyde bath. Cleanliness in every particular is essential if a recurrence of such bothers as these is to be avoided.

MOULD

A bed of tomato plants affected with Leaf Mould will have yellow patches upon the upper surface of the leaves and immediately under those patches upon the other sides, a greyish mould that darkens in colour as it develops. It generally comes in moist muggy conditions and when lack of circulating air is pronounced, therefore the surest way to prevent it is to avoid those conditions. Dusting with flowers of sulphur will check it. There are varieties of tomatoes that are more resistant than others, and where plants are affected every year, these varieties should be tried. One is named Vetomold.

WILT

Another disease that indoor tomatoes are prone to is known as Wilt or Sleepy Disease and the symptoms are a persistently severe wilting and drooping of the foliage. Market men strive to save a crop by top-dressing the bed and watering with Cheshunt Compound, but the small grower is advised to keep his eyes open and destroy any obviously affected plants.

ROOT ROT

There are several diseases, much alike, that cause plants to collapse quickly. Some attack the roots and others cause the stem around soil level to rot or go hard and woody. For instance, there is one disease called "Didymella." It wrought havoc in large nurseries during the early summer of 1943. There is nought to do but pull up every plant directly it collapses so that the trouble may not spread. This disease attacks both indoor and outdoor plants. Most of the diseases of the virus type and Leaf Mould seldom attack outdoor crops, but "Didymella" is not particular where it begins and where it finishes.

The beginner should know that these diseases and troubles exist, in order to make him careful to strive to avoid them, but he should not get perturbed about them any more than he does about scarlet fever, or cancer, or the other things that afflict mankind. They appear most frequently in plantations of large dimensions where overcrowding is rampant and repetition of crop is overdone. I always say that half the cause of these troubles is Nature wielding her power of overcoming human attempts to over-produce one form of vegetation at the expense of the rest. We must remember that the tomato is a native of South America and it is subjected to conditions in this country that do not occur at home. When the right conditions prevail in this country, the tomato plant

is perfectly happy. Those fungi attack when the opposite is the case. In the year 1943, the spring was early and warm and young seedlings grew amazingly well. June was damp and muggy and the growing plants "picked up" all sorts of troubles. The weather improved in July and the plants revived.

OUTDOOR TOMATOES

I have grown large quantities of outdoor tomatoes for several years, and, unless anything fresh happens, I shall continue to do so. Although a preponderance of green fruits is the result in some years, the chances of most of the crop ripening before the end of the season are in the favour of the grower. The fruits are not as "finished" as indoor-grown, but they are very good for cooking purposes and are appreciated in most households.

The site for the outdoor bed should be the sunniest spot of the garden. Trained against a wall, the fruits are almost of equal quantity to those grown indoors, and heavy yields generally result. Ordinary garden soil is sufficient. It should be changed when tomatoes are grown upon the same site year after year, it being little trouble to take fresh soil from another part of the garden. But be careful not to take that which has borne many potatoes, for these two crops are related and are prone to similar diseases.

Varieties are no different to those grown indoors. Although there are several rough sorts specially recommended for outdoor cultivation, my experience is that the better varieties, such as Ailsa Craig, Best Of All, Potentate and Kondine Red, are equally as good in habit, and better in quality. When the outdoor weather is unfavourable, all are bad and when good conditions prevail, all are good.

As we have seen, all plants must be raised under glass and the outdoor ones should be started towards the end of February. The point to stress here is that they should be properly inured to outdoor conditions before they are planted in the borders. They should be transferred from the greenhouses to the frames during early April and then be gradually introduced to open air until they can be left uncovered by day and night. This should be in early May. If a frosty night is imminent at that time, the plants should be covered during the danger period. But it is wrong to keep them covered all the while for safety's sake. They should be kept as sturdy as possible and be given plenty of room between pots. It does not matter if they become a little bit starved provided they do not grow leggy and spindly. The foliage should have a bluish tinge rather than a soft green look and the whole appearance should suggest toughness rather than lushness. They can be planted out in late May and early June, according to the nature of the weather and the locality.

I generally like to fork a little special fertiliser into the bed before introducing the plants. The stakes are inserted before the plants are planted. They are spaced about 2 ft. apart and the rows are criss-crossed so that the maximum amount of sunshine reaches each plant.

Training and tying are carried out in exactly the same way as recommended for the indoor crop. When four trusses of flowers have formed, the top is nipped out to stop other trusses forming, for the weather is seldom kindly enough for more than that amount to mature and ripen.

When the first fruits form, some more fertiliser is given according to instructions upon the tins or bags and the roots are watered if the ground is dry. Directly that is done, the whole surface of the bed is mulched with dried grass. In my case, I mow the orchard grass at that time, allow it to dry a few days and then gather it up, take it to the tomato bed and spread it between the plants. It keeps the roots moist and cool and saves the trouble of giving more water or fertiliser.

Mulching also stops the fruit from splitting and cracking. This bother is a frequent one with outdoor tomatoes and there are several accredited reasons for it. I have experimented with mulching during several seasons and I find that the crops upon the plants that are mulched are much better in quantity and quality than those where this was not done.

BLIGHT

In most muggy seasons the Potato Blight is a menace to tomato crops. It appears upon the foliage in the form of dark coloured patches that are edged with a mildew foam. Fruits quickly contract the trouble and rot follows. The trouble spreads quickly and a whole crop is quickly ruined. Once it has become established, nothing will stop it. Preventative spraying keeps it at bay for a long while and often saves the complete crop. It is necessary to spray two or three times in order to cover the foliage and stems with an immunising film of copper sulphate. Burgandy Mixture is the standard wash and the R.H.S. recipe for that is :

1 lb. Copper Sulphate	$\frac{1}{4}$ oz. Saponin
$1\frac{3}{4}$ lb. Washing-Soda	10 gals. Water

Dissolve the sulphate in five gallons of water in a wooden or earthenware vessel and the washing-soda in the other five gallons of water. Mix the two solutions together and add the Saponin, stirring it well in. It must always be freshly made for each application.

There are ready-made brands of the same sort of mixture available.

I prefer to use a patent Colloidal Copper Wash known as Buisol.

The first spray is given in early July, the second one a fortnight later, and the third one in early August.

We are assured that the small amount of copper adhering to the fruits is unharmful to human beings.

RIPENING THE FRUITS

Outdoor fruits ripen more slowly than indoor ones and are generally more solid. They are best "finished" indoors. They are gathered when red and laid in trays in the greenhouse. They will ripen equally well in a cupboard or drawer. Those laid in the greenhouse are shaded, rather than exposed to the sun. They soften more evenly than when exposed to sunshine upon one side only. This rule applies to indoor-grown fruits as well as those matured outside.

FINAL NOTE

Directly the crop is finished is the time to collect together all the roots and stems and leaves of the old plants and burn them, for if they are put upon the compost heap along with other garden rubbish the chances are that Trouble is being stored.

II. MUSHROOMS

My first attempt at growing mushrooms was an incomplete failure. I followed instructions diligently, waited for results in vain and disgustedly threw the materials on to the potato plot. Lo and behold, several pickings of good " cups " were collected from among those vegetables a short while afterwards ! This was a very pleasant surprise but I have since learned that it was not a unique experience. It happened several years ago.

My latest venture, which has only just finished, is a different story. I made a bed in an unheated greenhouse during November. It only covered 80 sq. ft. and I gathered 120 lb. off it during the ensuing January, February and March. It was cleared out in April to make room for a batch of tomatoes, after giving the family many relishable dishes and bringing in nearly £20 cash.

Cultivating mushrooms is a profitable venture providing all goes well. If something goes wrong, it is a somewhat expensive experience. Manure and spawn are costly items. If one has a garden, the manure is not wasted, but looking at the proposition from the outlay viewpoint, it is somewhat in the nature of a gamble especially in the experimental stages. If the

gamble comes off, the results are decidedly encouraging and the grower can be justifiably proud of the achievement, as well as pleased with the profits.

As with all the other worthwhile forms of work, success will come most often to those who take the trouble to understand the subject. To be aware of the likes and dislikes and the behaviour of mushrooms is to win the battle. Growing them is a sort of war against all the other many things that live as mushrooms do, or live upon them.

We know that the mushroom is a fungus. It is a member of a large world of living creatures distinct from animals or plants. Mould that annoys us by spoiling cheese, jam and old boots, is a poor relation that is always with us. I would liken mushrooms to human beings (my weakness is that I do this with everything). Just as we are different from the animals, although essentially the same, so are the mushrooms different from the majority of fungi. Toadstools are on a par with the monkeys, and jam mould is the lowest order, whatever that may be. Mushrooms, like human beings, are prey to a host of parasitical things. They get their own forms of diseases or are liable to be attacked by other forms of fungi. They, too, must have the right sorts of food if they are to flourish, and they have to go through a long incubation process before becoming prime mushrooms.

The life-cycle of a mushroom is in three consecutive forms. First is the spore, which is a kind of minute

seed. Many spores together form a dark powder that can be shaken from the gills of a developed mushroom after it has been dried. In the natural state, these spores are blown about by the wind. Some of them land upon herbage that is eaten by animals. They pass through animals in the manure and develop into mycelium or spawn. Some of the others grow where they settle. The majority perish. The spawn itself does not always come direct from spores, because it also has the ability to spread or "run" of its own accord. Man has been able to artificially increase spawn by both processes—raising from spores and "running" or spreading. From the spawn come the mushrooms when the weather and the conditions are suitable. If unsuitable, the spawn will remain in a dormant state for long periods.

The spawn we buy can be of good quality or it can be very bad. Some is "run" on to bricks that are made of fresh horse droppings and cow-dung mixed together. These bricks are moulded into shapes and, after a process of partial drying, are inoculated with bits of spawn taken from other bricks. They are then put upon a special hotbed so that the spawn spreads (or runs) quickly all through the brick. Directly the mouldy-looking spawn is spread all over it, each brick is taken from the hotbed and dried off thoroughly and then stored away in a cool place. That, roughly, is the process a mushroom brick has been put through before it is sold in the shops. There are all sorts of

risks appertaining thereto. The bricks may have collected other competitive fungi in the process and they might not have been dried off at the most beneficial moment. Much skill is needed in this part of the game.

Modern "Pure Culture" is far superior to the old stuff and is started from spores more often than from haphazard "running spawn." The spores are taken from selected mushrooms and are developed into mycelium (or spawn) in a concentrated form. Instead of the old weighty bricks, we can buy a quart carton of a mouldy-looking lump of hay and manure that is enough to inoculate a large bed. I have actually obtained over 200 lb. of mushrooms from 1 quart carton. Another advantage of the modern "Pure Culture" spawn is that it is much more virile, and it is unnecessary to remove so much of the straw that is mixed with the horse droppings when it comes from the stables.

MANURE FOR MUSHROOMS

As manure is the best and simplest medium for the culture of mushrooms, this should be considered before thinking about any alternatives. We have already seen that mushrooms can spread from place to place through the spores passing through cattle. We also know that the mycelium is able to lie dormant for goodly periods and then spring into activity when the right conditions arrive so that more spores are formed for the purpose

of spreading over the earth as well as through it. The mycelium of the cultivated mushroom flourishes most naturally in degenerating horse manure, therefore, if we add spawn to the manure, that spawn (or mycelium) spreads through that manure and then, if the right conditions continue, forms the mushrooms that we are most concerned about. We prepare the manure in the most scientific way that will bring the most likely good results.

Modern growers use strawy manure just as it comes from the stables. The best of all bedding is that consisting of good clean wheat straw and when well tainted with manure is in an excellent state for our purpose.

Supposing you have collected a largish heap of manure from the stable, or have bought a load, the first thing to do is to shake it thoroughly and pile it lightly into a conical heap. If it can be managed, it should be piled in an open shed, just so that the steam can escape, but abnormal rain does not "kill" it. A temporary roof upon four posts will do. Within a day, the heat will begin to generate and steam will rise from it. After four or five days the whole heap should be turned over, the bottom should be worked into the top and the sides to the middle, so that all becomes heated equally. The chief thing to worry about is shaking up the heap with the fork so that it becomes thoroughly mixed and "light" (the term as applied to pastry). The turning process should be

repeated three or four times until the heat has a less disagreeable smell and is a nice rich brown colour. If too dry at the time of the second turning, a little water can be sprinkled over it, but it is unwise to use much additional moisture without reason, for the heat is "killed" when the heap gets wet and clammy. To test, take a handful and squeeze it tight. If it is in good condition the hand will be moist when the manure is released. If moisture oozes out through the fingers, it is too wet. It should never get to that state. Generally, about four turnings will be ample before the heap is ready to be made into the proper mushroom bed.

SUITABLE POSITIONS FOR MUSHROOM BEDS

Cellars, sheds, cupboards, greenhouses and cold frames, will be suitable places in which to lay down the beds. A specially built mushroom house has slated shelves, one above the other, much after the style of the parcel racks in railway luggage offices. It has also hot-water pipes running around the walls, but these conveniences are not essential. A bed can be made on the floor if no shelves exist.

To build the beds most carefully is important. The manure should be barrowed from the heap and shaken up again as it is placed upon the site for the bed. Scatter a few forkfuls over the bottom so that there is an even depth of 4 in. or 5 in. Beat this down all over its surface with the back of fork-tines. When

bashed down nicely, another layer of about 5 in. should be placed on top and another beating given. A third layer and a fairly good beating down will complete the pile, which should by now be flat, firm and about 10 in. high.

After the manure bed has been completed, it should be left for several days to re-develop heat. If the straw and the manure is moist but not wet, and not fully rotted, it will probably develop a temperature of 80° Fahr. or more. This can be tested by a special thermometer with a plunge-point end and a regular grower is advised to get one. Failing that, a stick should be thrust into the bed obliquely and left. This last makeshift can be pulled out occasionally and felt by the hand. When first put in and pulled out again, it will feel cool. After three days it will become warm. After three more days it may be warmer. In time it will gradually get less warm and the bed will return to atmosphere conditions again. This is a particular part of the business, for there is a right time to inoculate the bed with the spawn. We must remember that a hotbed at its height of warmth will spoil spawn instead of cause it to grow. Only when the bed decreases in warmth and when its temperature has fallen to about 65° Fahr. should the inoculation take place.

We generally cover the bed immediately after it is laid to preserve moisture and stop the necessity of watering—a risky undertaking. The usual practice is

to put straw over the manure, but I prefer to rig a sort of sack awning over the bed about 6 in. from the manure surface. I do it because my bed is made in a greenhouse, and this same awning keeps light from the bed later on but does not interfere with the mushrooms.

It is well to note at this stage that meadow mushrooms generally arrive after soft rains in the days when light and heat are beginning to wane. That explains a lot.

When satisfied that the temperature of the manure bed has dropped to 65° Fahr. the spawning should be done without delay. A fresh quart packet should be obtained and broken into about fifty pieces, unless the bed is so small that a smaller sized carton is sufficient. These smallish pieces should be spaced out over the bed so that they are about 10 in. apart in all directions, therefore, a quart carton is sufficient for a bed covering 40 sq. ft. Each piece of spawn is planted in the manure. The surface of the manure is prized up and the spawn is placed in the cavity and then the manure is pressed over it so that the piece of spawn is about 1 in. below. The spawn should be fitted into the manure, as it were, so that it contacts completely, otherwise it cannot run, for the spawn runs into the manure much in the same way that moisture penetrates blotting-paper. If there is a space between it does not contact. After the spawning is completed, the covering of straw or the awning should be replaced and nothing worried about for a fortnight.

Ordinary mushroom spawn is sold in bricks and it takes about sixteen bricks to make a bushel. These cost just about as much, or a little more, than a quart carton of the Pure Culture Spawn. The bricks should be broken into pieces the size of pigeons' eggs and planted in the manure about 2 in. deep, spacing them 6 in. apart. Whether planting Pure Culture Spawn, or the bricks, every little piece should be inserted somewhere in the manure, for it has the power to increase and to impregnate the manure that is around it.

SOIL CASING

After a fortnight's wait, the bed should be examined to see if the spawn is running. If a mould has spread from the lumps into the manure, it can be assumed that the spawn has "taken," and the next stage—earthing over, or "casing"—can be completed. Soil is laid over the bed to a depth of 1 in. The protective litter, or the awning, is removed from the bed and the surface is lightly sprinkled over with water before the soil is placed over it and flattened down lightly with the back of a shovel. At the time it is put on, it should be slightly moist, but not definitely wet. A handful should be taken from the heap and squeezed tightly. When the hand is opened, the lump should remain intact upon the palm, but it should crumble into bits readily when it is dropped on to the heap.

A great number of disappointments are due to casing

the bed over with bad soil, or putting too much on. Soil taken from the garden is generally contaminated with insect or fungus pests that will destroy the spawn. To make sure of good soil, we generally go to a field, remove a batch of earth to a depth of a foot and then take some from below the top "spit." Lightish sandy soil is best. It is sifted rather finely and a 5-in. potful of freshly slaked lime is mixed in with every barrowful of sifted soil. We like to get it ready before we need it because the lime will drive pests away and it has a beneficial effect upon the soil during three or four weeks' storage.

After the casing is completed, the covering or awning is placed upon the bed again and kept there. Mushrooms will arrive about two months later.

CULTURAL FACTS

I have already stated that specially constructed mushroom houses are fitted with hot-water pipes. They are an advantage where mushrooms are grown throughout the winter, their use being to keep an even rather than a warm temperature. The happiest mushrooms arrive when the temperature of the building is not more than 60° Fahr. and not less than 50° Fahr. If above, they go wrong and if less they grow too slowly.

They like, but do not insist upon, semi-dark conditions and a damp atmosphere. We syringe the walls and sprinkle the paths once, twice or thrice daily

to keep that dampness. If there are no pipes and the temperature is between those two extremes, one daily damping would be enough.

It is better to keep the beds themselves rather dry. If the atmosphere is kept damp, there should be no need to water the beds at any time until mushrooms appear, but, occasionally, there is an obvious utter dryness and then some warm water should be sprinkled on the casing to soak the soil without penetrating to the manure. Do this in a series of five sprinklings rather than by one good soak. After mushrooms begin to arrive, it may be necessary to sprinkle the bed once or twice a week, but the password is "steady" with the water-pot at all times.

Mushrooms need fresh air and the ventilators or windows should be opened when the outdoor temperature is 55° Fahr. or above. In the winter we must be careful, but we like to let in a little air during the warmest hour of the day, except in the worst weather.

BEST GROWING SEASON

We like to start our first mushroom bed in the greenhouse during early October so that we have a crop during Christmas and the New Year. This suits us in the south, but I should think that September would be a better month to make a bed in the northern counties. Mushrooms, as we have already seen, like a warmer temperature during the spawning period, than

they do during the cropping-time, therefore the preparation of the beds during September is a natural time, for the temperature drops gradually after that, and that suits the mushrooms until it falls below 50° Fahr. A good bed in the right temperature will continue to produce "cups" for three months.

One of the worst times to start mushroom culture is early summer. It is a job to keep the temperature down to required level, and the resulting crops are generally of poor quality.

A HEATING TIP

We have already noted the fact that the mushroom depends upon heat and atmosphere and those two elements, combined with the manurial medium, cause them to flourish. We know that a hotbed gives the right temperature when it is waning from the peak period, and that the mushrooms enjoy this gradual cooling down. But it often happens that the bed cools too rapidly and gets so low that the mushrooms refuse to make further efforts. When we have warm pipes we use them. My way of overcoming a lack of pipes is simplicity itself. Instead of filling a whole greenhouse, or shed, or building, with a large bed, I divide the space into three parts and have three beds that are made in sequence at six-week intervals. The heat and live moisture given off by each new bed keeps the interior warm and has a beneficial effect upon the waning beds. The October bed generally produces

the heaviest crop. The additional beds that are made during November and just after Christmas give it a sustained fillip.

PEST TROUBLES

There are several crawling pests that like mushroom beds, but the difficulty of dealing with them effectively is the fact that, for obvious reasons, poisonous antidotes cannot be used. Woodlice, Fungus Gnats, Mushroom Mites and Springtails are the most common foes. Springtails can be detected by their peculiar way of hopping about like miniature grasshoppers, and if tin lids filled with oil are placed upon the soil, these insects will hop into the oil and their doom. But this does not clear the bed and a bad infestation spoils a crop. The best way to deal with these pests and all the others is to stop them coming and then there will be no partly eaten or holed cups—the sure signs that some one or the other of them is present.

Cleanliness is the first essential safeguard. The building should be kept as clean for mushroom beds as it should for food. All brickwork and woodwork should be cleaned down before a new bed is laid. A bucket of fresh limewash and a good brush should be used liberally, and as often as convenient. Woodlice lurk under boards and in crevices and they also hide in heaps of straw and rubbish. That is another reason why I prefer to use awnings over the beds instead of straw.

Another precaution is to dust the surface of the manure after spawning, and just before the casing operation with a non-poisonous insecticide of the Derris type. I like to use a proprietary Colloidal Powder that is made of Pyrethrum and Rotenone. A little puffed into the atmosphere twice a week is also beneficial.

Fungus diseases are a different proposition. Pure Culture spawn and care in getting soil from below the surface minimise the chances of such diseases starting. Heating the manure in the natural process of "hot-bedding" kills the germs that are likely to be in the straw and the manure. Cleanliness in such ways as taking away all pieces of stalks and keeping the pathways swept are other items that matter. Once a fungus gets into the bed no curative dressings can be given because the mushroom itself is a fungus and it would be destroyed. However, should a clump of mushrooms appear to be badly misshapen, or seem to have abnormal characteristics, the thing to do is to carefully scoop out the affected clump, soil and all, and fill the hole in with a few handfuls of freshly limed soil, as used for the casing.

GATHERING THE CROP

All mushrooms should be pulled. Never on any account cut them off, as the stumps are a menace to the young mushrooms around them and they hinder further development. Twist each one out of the bed

carefully so that the tinies round the base are not unduly disturbed. If the removal of a cluster of cups makes a hole, fill up with a little more limed soil.

VARIETIES

There are many varieties of the mushroom (*Agaricus campestris*) and those we cultivate are different from the wild field kinds. For our purpose, we need only be concerned with "White" and "Brown." Although the white variety of Pure Culture Mushroom is the most popular, I prefer the brown, for my experience is that the dark-skinned sort is a heavier cropper and is equal in quality. Brown-skinned mushrooms grow somewhat larger in the early stages of a bed and that may be a drawback. When a single cup weighs 1 lb. and the price is 4s., the customer is not so satisfied as when twenty or more small "cups" are necessary to give the same weight.

OUTDOOR MUSHROOMS

Because the varieties are different, it is a precarious business to try and grow cultivated mushrooms in a pasture. However, if anyone wishes to try the best procedure, it is to cut out pieces of turf about 6 in. square, and 1 in. thick, here and there, about the meadow or lawn. Stir up the soil below, insert a small piece of spawn and then replace the turf. If fancied, a little manure can also be mixed in with the soil. A dry spell afterwards is more conducive to a

possible crop than much wetness. The end of June is the most favourable time for doing it, as the bright spell will probably precede the moist mild weather of autumn, when the mushrooms are likely to grow.

Market-growers in some parts of the country grow mushrooms in outdoor beds. The manure is prepared in exactly the same way as prescribed for the sheds, but, instead of making flat beds, it is eventually built into triangular mounds much after the fashion of potato clamps. These mounds, or ridges, are about 30 in. wide at the base and the height is similar. They are built with the utmost care and are made fairly firm. Long litter is laid over directly the manure is in position. It is removed temporarily for the spawning process, and for the casing process and every time the mushrooms are gathered. It is replaced quickly in order to preserve heat and to ward off rains. Even when the crops are being gathered, only a small portion of the surface is exposed for a few minutes, and then recovered before the next portion is dealt with. In very wet seasons tarpaulins are often used to keep the rains out. Needless to say, the site should be sheltered and well drained.

MUSHROOMS WITHOUT MANURE

As thousands of people know, there are processes for growing mushrooms without manure. They generally consist of substitutes, such as chaff, to which has to be added a generator. That results do follow is an

undoubted fact, and they are worth people's attention when horse manure cannot be obtained. Nevertheless, from the marketing point of view, they are not so popular as the original way, and I shall stick to manure as long as I can get it. I saw a small bed in a cellar recently that yielded a good crop through the grower following a patented process. He told me that his only trouble was that a fungus disease had found its way in and he had had trouble in removing it. I suspect that his substitute for the straw had not been sterilised, whereas, with ordinary manure, as I have already stated, the act of fermentation itself is a natural sterilisation. Anyway, full instructions are issued with the proprietary materials and these should be followed in every detail in order to have mushrooms.

III. CUCUMBERS AND MELONS

CUCUMBERS and melons are more difficult to grow than tomatoes. They demand more warmth, moisture and attention. Their original home was the tropical and semi-tropical countries where there is considerable humidity and we have to give them the right conditions in our greenhouses.

The most suitable sort of greenhouse has no ordinary staging. The house itself should not be very wide, nor high, and a pathway should run down the middle. The path should be bounded by walls that are about $3\frac{1}{2}$ ft. high, so that troughs are formed on each side between the path and the outer walls. These troughs, known as "pits," should be about $3\frac{1}{2}$ ft. deep and just about as wide. If the greenhouse is heated the hot-water pipes should be laid along the floor of both pits and a grating is generally placed over the pipes to hold the compost in the bed above. In such a pit, the space above the pipes and grating is quite 2 ft. deep, and as we have already seen, about $3\frac{1}{2}$ ft. wide. This enables the grower to make a good bed of considerable depth. Immediately over the grating is placed a layer of broken potsherds, or brickbats, to provide drainage and enable the heat from the pipes to penetrate the beds. Incidentally, there are holes made in the walls alongside the path to allow the surplus water to escape

into the pathway from the beds. This moisture quickly evaporates into the atmosphere.

People have their own recipes for the compost that constitutes the beds. I invariably mix together equal parts of nice lumpy loam and the decayed material of an old hotbed. Before that is tipped into the pits, a thin layer of dry leaves is placed over the potsherds to keep the compost from falling down into the lower parts. The compost is placed on the leaves, the pit being filled to within about 4 in. of the top rim. At least, the compost is not put higher along the front of the pit, but at the back it is raised slightly in some places, and at others is piled to form an undulating bed with anthill-like mounds standing up at 4 ft. intervals. Cucumbers need to be planted about 4 ft. apart and the apex of each mound is the prospective site for one plant. But, before any planting is done, the bed is given a coating of pure loam to a depth of about 3 in. The tops of the mounds are coated a little more deeply so that the roots of the plants travel a few inches before they get their toes into the rich compost.

Gardeners will tell you that a subject needs "bottom heat." They mean that the warmth must come from below the bed and a greenhouse built this way fulfils the necessity. Both cucumbers and melons need bottom heat when they are grown early in the year, but it is possible to dispense with that luxury from June onwards. In that case the pit can be filled in exactly the same way. It need not be so deep, or the

lower part can be made up with breeze, or bricks, in place of the pipes.

However, those people who possess houses with plenty of room can still have early cucumbers and melons, even though the fire heat is unavailable. Instead of the pipes and the composted bed, the large lower part of the pit should be filled with hotbed material. This fresh material is prepared in exactly the same way as described later in this chapter for making hotbeds outdoors. Instead of piling it into a heap for a frame, it must be placed in the pit. No drainage is necessary (beyond the holes in the retaining wall alongside the path), the idea being to fill the pit with as much hotbed material as possible. It is crammed in almost to the top. After being smoothed down, a small layer of the compost (half old hotbed manure and half loam) is placed on top and the bed is finished off in exactly the same way as when pipes are used. The sparsity of the compost will be made good by the fresh hotbed material itself, into which the roots will run when they become robust.

Whether the bottom heat is supplied by pipes or by the hotbed, several days should lapse before the plants are installed. Settling down and warming through are necessary in both instances.

RAISING CUCUMBER SEEDLINGS

It is little use trying to raise seedlings before a good temperature can be maintained, either by heated

pipes, a hotbed or natural sunshine. Seeds seldom germinate well when the temperature is below 65° Fahr. Directly that can be maintained, they will grow quickly.

Seeds are best sown singly in small pots, for if more than one is in a pot the roots become entangled and they are damaged when planting-time comes. This is most detrimental. The compost as recommended for tomato seeds is ideal. Plant each seed nearly, but not quite, $\frac{1}{2}$ in. deep and place it on edge rather than flat or end upwards. After all the pots are ready, they should be put in a box and placed near the pipes, or be buried in a hotbed, so that only the surface of the soil in the pots is seen. Directly the seedlings peep through, they should be placed in a sunny place. They are ready to be transferred from the pots to the hillocks in the bed when the third leaf forms. If left too long in the pots, they become potbound and unhealthy.

Healthy cucumber plants will grow quickly, bear a lot of fruits and, as I have already stated, demand a lot of room. We train them over a wire trellis that covers the inside of the house from just above the bed level to the apex of the roof.

SUPPORTS

Cucumbers will either sprawl over the ground, or they can be supported by overhead trellises. We generally grow them in greenhouses by the second

method and adopt the easier course for the frame plants.

The wires, or whatever is used, should be fixed in position firmly and should be at least a foot away from the glass. If placed too near, the plants suffer through scorching.

When a plant is first tipped from its pot and is planted in the soil, a stick or short piece of bamboo, is inserted in the bed to raise a support to the lowest horizontal wire. As the plant grows, it is tied to this rather loosely. When the top of the plant reaches the wire, the extreme tip of its growing point is pinched out in order to make the plant develop side-growths. In spite of this pinching, it will also continue to grow upwards, or at least, part of it will and it is encouraged, or discouraged, to eventually cover the whole of the trellis by constant training. When it makes too much growth, some is pinched out, while in other places the best shoots are trained in the direction the grower would have them go. There is no hard and fast rule about "stopping" a growth, as the pinching-out process is called, but the idea should be to cause the plant to continue to make fresh growths that bear fruits and to pinch out the growing tips here and there to stop one particular shoot from growing too strongly or bearing too many fruits at the expense of the rest of the plant. A balance of growth and fruiting is maintained by judicious treatment, and the grower, with ordinary

aptitude, soon knows what he is about. A well-trained plant will bear scores of fruits over a long season, and there will always be some hanging in varying degrees of development from the time that fruiting begins.

SYRINGEING AND VENTILATION

One of the problems the beginner must solve is when to syringe and when not to syringe. Cucumbers like moisture but they do not like clammy cool conditions. They like fresh air but they abhor draughts. In warm weather they like a lot of moisture in the air. In the spring, when the outside air is cool, it does not do to spill much moisture too much around. Nevertheless, moisture is needed provided the temperature is not below 60° Fahr. and the air is buoyant. When the plants are growing nicely, I like to syringe the foliage in the morning when the sun is warming up the atmosphere. During the day, plenty of water is splashed around the walls of the house and in the evening the plants are given another syringeing when the ventilators are closed. But if the evening is dull this last syringe-over is missed.

The plants are given light shading in bright sunny weather. There are alternatives to this. For instance, some growers do not open the ventilators, and make the greenhouse almost a Turkish bath by keeping water splashed around, but it is far better to give ventilation and slight shading when the

temperature rises above 70° Fahr. I stress light shading, because the cucumber wants light.

TOP-DRESSING

Those plants growing upon the mounds send their roots into the rich soil and also send them out through the surface in quest of more goodness. It is given them in the form of light dressings spread over the surface, the compost being rotted manure and loam well mixed together.

POLLINATION

Like the rest of the cucumber fraternity, the plants bear both male and female flowers. Unless the fruits are wanted for seed, there is no need to pollinate the female flowers. As a matter of fact, the fruit is preferable to eat when fertilisation does not take place. Some growers nip off the male flowers. I never bother.

MILDEW

Mildew sometimes appears upon the leaves during late summer. If it can be managed, the best antidote is vaporised sulphur. A Campbell Sulphur Vaporiser needs careful usage but it is most effective if the instructions issued with it are followed sensibly. An alternative is to dust the foliage with flowers of sulphur and there are patent blowers available for this purpose.

Melons and cucumbers are prone to a disease known as Melon Leaf Spot. Small green spots appear on the leaves and then increase in size and turn brown. Once they get it, the best course is to destroy the plants and thoroughly cleanse the house and change the soil before growing either of these fruits again.

Red Spider will attack cucumbers if the latter are kept too dry. The proprietary insecticide known as "Volck" should be used if the foliage looks dirty and worried and some minute reddish insects can be seen crawling about. They make fine webs upon the foliage when well established. Moisture is objectionable to red spider and this fact should always be remembered.

FRAME CUCUMBERS

The ordinary smooth-skinned cucumber can be grown in a cold frame during summer, but the seedlings should be raised in the greenhouse during late spring, and then acclimatised before being planted. One plant will fill an ordinary 6 ft. by 4 ft. glass light when fully developed.

The bottom of the frame should be filled with soil and the middle piled up so that the plant is planted upon a mound in the middle of the floor under the glass.

It is best to arrange the mound so that the top of it is about 15 in. below the glass roof, while the outsides

gently slope away so that they are about 2 ft. lower than the glass against the wooden sides of the frame.

An ordinary frame 6 ft. by 4 ft. will hold one plant comfortably, or two uncomfortably. When two are planted, they should be put about 6 in. apart as near as possible to the top of the mound. After being planted, the glass light is put on so that it excludes air and a little shading is given if the sun is very warm. The plants are syringed in the morning and early afternoon. After a day or two, when the plants have recovered from the upheaval, a little air is given them when the sun shines brightly. The syringeing is continued. The air is given by putting a small wooden block, like a brick, under the top end of the sloping light. If the wind cuts in that way, which it shouldn't if the frame is in a warm protected corner, the block is put under the light under the lowest end.

When the cucumber plant has produced about a foot stem, the extreme tip is nipped off, causing side-growths to form. Consequent treatment of that sort consists of pinching back those sideshoots and training the plant so that it never crowds the floor and is continuously producing fresh shoots upon which the fruits arrive.

If the fruits are cut when they are fairly large, but not fully developed, the crop will be a larger one in the long run. There are special bottles and things to keep cucumber fruits straight when they lie on earth, but they are not absolutely necessary. Pieces

of slate will often keep fruits clean upon the undersides. It is just a question of using one's discretion in this matter.

HOW TO MAKE A HOTBED

When cucumbers cannot be raised indoors, it is still possible to have them by the hotbed method. This hotbed is built, and the frame is put on top. I actually build a lot of hotbeds every January, in order to have early lettuces and carrots, but I should not think it would be wise to build one specially for cucumbers before April. As stressed in the early part of this chapter, this plant likes constant warmth. If started too early, the hotbed would lose its heat before the weather is advanced enough to give the right temperature. However, seeing that a hotbed is so useful an adjunct to early vegetable culture and to cucumber culture in the early summer, it is well to know how to set about that job.

The chief materials are strawy horse manure and dry leaves. These are wanted in equal quantities. The horse manure should be fresh and two good cartloads will be enough to support a "double light" (the glass section of a frame is a "light"). An ordinary standard light measures 6 ft. by 4 ft., therefore two lights cover an area of 48 sq. ft. More than one load is necessary for one light, simply because the hotbed supporting a light must be at least 1 ft. wider at the base than the measurement

of the light. The base of a hotbed for a double-light frame must measure 10 ft. by 8 ft., whereas a bed for a single light must measure 8 ft. by 6 ft. Apart from this fact, a double-lighted hotbed will retain its warmth longer than a smaller one because the greater bulk has a proportionately smaller surface from which the heat escapes. Whether one or more lights are used, the quantity of leaves must equal the manure bulk. Dryish oak or beech leaves are preferable to all others. The object of the leaves is to slow down and prolong the heating process of the manure. Everybody knows that fresh horse manure generates heat. It does so quickly when the conditions are right. If it is checked, it will go on doing this steadily for three months. Leaves are checks. But to get a hotbed to throw up a steady heat over a long period can only be ensured by careful treatment.

When the leaves and manure are brought to the site, they should be mixed together and piled into a conical heap. If neither are very wet or dry, the manure will begin to "sweat," and give off steam and scent. After four days of that, the heap should be turned over so that the outside becomes the inside and the top is put at the bottom. This ensures equalised combustion. If the heap gets very rank again, it is re-turned over in much the same way. All the straw is well shaken up, so that there are no lumps, while the leaves become thoroughly mixed

with the manure. When the pile is generating a fairly hot steady heat, it is ready to be built into a hotbed.

At this stage the site is marked out and lumps of the mixture are laid all over the floor. The fork is used freely to shake up the stuff so that it is spread over evenly. When about 8 in. high, all is beaten flat with the back of the fork to make the bed firm. Another layer is spread over that and flattened down in the same way. The procedure is repeated until the firm rectangular bed is nearly a yard high. If constructed properly, the top surface will be firmly flat. It need not be level. In fact, if it slopes slightly towards the front or south edge, it is better that way.

The wooden sides of the frame are placed on top and the glass lights are placed upon the frame. A little ventilation is given to allow the condensed moisture to escape through the top. After a day or so, the bed of soil is laid over the manure surface inside the frame. This soil can be spent tomato soil from the greenhouse for crops like carrots and lettuces, but new compost is best for cucumbers. If for cucumbers, it is mounded just as though for an ordinary frame. If for the other crops, it is spread over evenly to a depth of about 4 in. It is put on rather loosely in order to let the heat from the hotbed get through into the space above.

If cucumbers are to be grown in the hotbed, I

should state that the best way to get them to germinate is to plant the seeds in pots in the ordinary way and then bury the pots to rim-level in the manure. They will get warmer that way. After the plants have developed three or four leaves, they can be tipped from the pots and be planted in the mounds. In all other respects, cultivation is similar to that advised already in this chapter.

VARIETIES

No matter whether the cucumbers are grown in a greenhouse, a cold frame or a hotbed frame, the varieties are the same. My favourite is Improved Telegraph. My second choice is Everyday.

RIDGE CUCUMBERS

Ridge cucumbers or gherkins do not need as much heat or attention as frame varieties. They are more podgy and prickly and are not valued so highly. Nevertheless, ridge cucumbers are good and I always raise a few hundred. Holes are made in the open ground during May. These are about 2 in. deep and 2 in. across and hotbed material is placed in each hole, right to the top. A layer of soil is placed over that and three seeds are planted upon each mound. Handlights are placed over them and are kept in position by day and night at first. Later on, they are removed during the day. Still later, they are entirely removed. I never bother about training, but

there is no doubt that a little shoot-pinching will help matters.

MELONS

Of the cucumber family, the sweet melon is the most difficult member of all to cultivate. There are so many snags. They need much the same conditions as cucumbers, but there are several differences in cultural details. I will assume that the reader has grasped the rudiments of cucumber-growing.

Melons germinate best in a heat of 75° Fahr. The preparation of the beds is very similar to that advised for cucumbers, but we generally use a slightly heavier loam for this crop.

Instead of nipping out the growing tip of the plant when the first supporting wire is reached, the plant is allowed to grow until it gets to the top horizontal wire, and then the tip is pinched out. The subsequent side-growths are trained outwards along the wires, until flowers and tiny fruits have formed and then the tips of these side-growths are nipped out too, thus stopping the plant from making any more leaf development.

The next difference is in fertilisation. The female flowers must be pollinated, for no fruits will form unless fertilisation is complete. Furthermore, unless several female flowers are pollinated simultaneously, the chances are that the plant will produce a very small crop indeed. Therefore pollination is not carried

out unless there are four or more female flowers showing. The pollination process is generally carried out by picking off a male flower, removing its petals and daubing the stigmas of the female flowers with its pollen-laden anthers. If the flowers "take," the miniature fruits behind them quickly begin to swell. Three fruits upon each plant constitutes a good crop. Any flowers that arrive after that are ignored and fresh growths are nipped off.

Melons must be grown quickly to be good. It should not take more than four months to ripen the fruits after seed has been sown. By constantly syringeing the greenhouse and maintaining a good warmth, this growing business makes rapid progress.

When grown in greenhouses upon the suspension system, the fruits will soon hang down from the wires and a net cradle must be provided for each. It is tied to the wires as though it were a tiny square hammock and it completely carries the weight of its fruit.

When the fruits are of good size, they begin to be covered with mysterious markings that are only the beginning of the process known as "netting." This marking and mottling peculiarity is more pronounced in some varieties than in others.

When the fruits have reached maturity, they begin to change colour and it is the signal to withhold the generous use of water. If watering is persisted in after this stage, it is probable that the fruits will rot instead of gradually ripening.

Once water is withheld, the foliage begins to deteriorate very rapidly and the fruits ultimately begin to smell melonish. The next step is to watch them and test them for ripeness. A fruit is ready to cut from its vine when the end farthest from the stalk is getting soft. If the thumb is pressed into the old flower-mark gently, the rind of the fruit will give slightly if it is ripe enough. At that stage, cut off the melon about an inch from its neck and leave it in its hammock, or net, for a day or two. After that, take it to a cool shed and let it ripen slowly until considered mature enough to eat.

Just as we also grow cucumbers in hotbed frames, so do we raise and grow melons in the same way. They are not so good as those grown in greenhouses, being slower in development, but they are better than no melons at all, and their chief quality is to extend the season towards autumn time. The hotbeds are generally started in June and the methods employed for cucumbers are adopted in most particulars. When the fruits have almost swollen to full size, they are lifted off the earthen floor and each one is sat upon an inverted pot. Pollination and other details are the same as for greenhouse plants.

MELON TROUBLE

If the plants are not kept moist enough while they are growing, the chances are that red spider will attack. The moral is obvious.

A far greater trouble is known as "melon canker." It arrives around the neck of a plant and makes a nasty scar. It generally comes upon plants that are not growing as lustily as they ought, and the direct cause is too much water around the neck. We always take great care to plant the seedlings upon mounds, and to put the water upon the beds so that it does not splash those sensitive parts. Some growers put a collar round the neck of each plant to keep moisture away. When the trouble is seen, the canker is gently scraped away and the wound is completely covered with lime.

VARIETIES

There are green-fleshed, scarlet-fleshed and pale-fleshed varieties of greenhouse melons. Blenheim Orange is a very old and typical variety of the scarlet-fleshed type. Hero of Lockinge is a renowned pale-fleshed sort. Prince of Wales is a green-fleshed sort. Generally, the scarlet-fleshed varieties are the most difficult to manage, while Hero of Lockinge is the safest one for a beginner to grow.

There are also the famous Cantaloupes, that are not so luscious, and are grown most successfully by the French. There are also hardy frame melons, that are not difficult to grow, and they are not so choice. These, and such as these, are worth trying—once.

IV. GREENHOUSE FOOD CROPS

DWARF BEANS

THE more sorts of forced vegetables there are in the first months of the year, the more is the housewife and her household pleased with life. We gardeners, who know this, spend much of our time in producing surprises. When we have the facilities, it is not very difficult, but where there are no greenhouses or frames and manure such luxuries cannot be grown. On the other hand, I do know that there are hosts of amateurs who invest in a greenhouse, only to make it a home for woodlice or spiders. These notes are an attempt to give them different and more profitable ideas.

Most people have a stock of large chrysanthemum pots. We see them "kicking around" in January with the butts of the old flower stems sticking in the surface of the soil. Eventually, the new shoots that grow from the soil in the pots are taken away as "cuttings" and then the pots are stood in an odd corner, being an eyesore and a nuisance, until they are wanted for new chrysanthemum plants next mid-summer. Both the pots and the material in them are excellent means of getting an early crop of forced dwarf beans. The procedure is simplicity itself. I

ought to know, having done it almost automatically for years.

The old chrysanthemum soil is shaken out of the pots and put through a coarse sieve to remove the roots and crocks. To the soil is added some leaf-mould and then the pots are recrocked, and partly refilled with the freshened-up compost. When the pots are filled to within 5 in. of the rims, about a dozen bean seeds are spaced out on the surface. A little more soil is put in each pot so that the seeds are covered to a depth not exceeding $\frac{3}{4}$ in. They are watered and then stood closely together in the warmest part of the greenhouse. The seedlings soon appear and if all seeds germinate, a few are pulled out to avoid overcrowding. On sunny days, when the temperature is not below 60° Fahr., they are syringed twice daily, but wetness enough to cause a clammy atmosphere is studiously avoided. When the beans have grown to the tops of the pots, a little more compost is spread over their roots. At the same time, some twiggy branches, such as the pieces of a broken-up birch broom, are inserted round the inside of each pot to provide supports for the plants. With ordinary attention, the beans eventually arrive and are gathered when the pods are about 5 in. long.

Quick-growing varieties are selected for this work. Every good catalogue marks those varieties that are most suitable for the purpose. Sunrise, Osborn's Forcing and The Prince, are the sorts of names they bear.

Climbing French Beans are also grown in green-houses. It is usual to plant the seeds in beds, the latter being prepared as for tomatoes. They are sown about 6 in. apart in straight rows and a string support is given to each plant. If the shoots of the plants are inclined to get out of hand, they are simply nipped off. Beyond syringeing, there is not much else to do except gather the crop when it arrives.

POTATOES

Potatoes can be planted and "dug" between Easter and Whitsun. They are planted in the same sort of soil, in the old chrysanthemum pots. Each pot has crocks placed over the drainage hole and is half filled with compost. One tuber is placed in the middle of each and more soil is added to fill the pot to within 4 in. of the rim. After the plant grows so that its head sticks out above the level, some more soil is placed round its neck as a sort of "earthing-up." It is "dug" by tipping out the contents when it is obvious that tubers are present. No attention is necessary beyond judicious watering. We like to put the potato pots upon the floor and make room for the beans nearer the roof.

Potatoes can also be grown in beds, but it is more practicable to grow them upon the floor of a deep-walled cold frame. The tubers are planted in rows in the soil that is several inches deep. They are spaced about 15 in. apart in all directions. No fertilisers are

given them, but it is usual to mix in some well-rotted manure before tubers are planted. They are planted in early February. They are wrapped up outside the frame, of course, during bad spells of weather and the sun is allowed to shine into the glass at every opportunity. Hardly any ventilation is given until the plants are growing and then they are treated in just the same way as the carrots, etc., growing in the hotbeds. (These are dealt with in the next chapter.) Incidentally, it is impracticable to grow potatoes on hotbeds. That is why they are mentioned here.

Wherever early potatoes are grown, the best possible varieties are Sharpe's Express and Eclipse.

FORCED ROOTS

Rhubarb

The easiest way to have any sort of forced delicacy in the New Year is to buy some "forcing crowns" of rhubarb and force them. Large pots or boxes of the orange-box type are prepared by putting some leaf-mould in their bottoms. Then the rhubarb crowns are placed in them closely together, so that the tips are level with the rim of the receptacles. Leaf-mould is pushed in between the crowns to fill up the spaces. They are watered and stood in the greenhouse, or a shed or cellar. Having a greenhouse, the places I allot them are under the stagings, where they are out of the way and are utilising valuable, but otherwise useless, room. Other pots or boxes of identical pattern are

placed upside-down on top of them, thus keeping the roots dark and yet providing enough top space for the stems to grow in.

One of the drawbacks of this method is that the roots are seldom any good for replanting, or anything else, once the crop has been gathered, for we must remember that all the goodness comes from the stored-up energy inside the "crowns," therefore, we leave them absolutely worn out. The people who specialise in growing rhubarb roots suitable for forcing charge a lot for them because they have to rear them and grow them for two or more years, without getting any other sort of return. If it can be done, the rhubarb forcer should grow his own roots for this purpose.

The way to begin is to buy rhubarb roots for planting in the garden. They are smaller and much cheaper than the "forcing crowns." These need to be planted about 3 ft. apart in rows that are spaced 4 ft. asunder. If planted in November, and allowed to grow for a whole year, without any of the "sticks" being pulled, they will increase in size and the foliage will die in the next autumn. Directly this happens, they should be dug up and the lifted crowns should be allowed to lie upon the surface for a few weeks during November and early December. This may seem a queer procedure until it is explained that the natural home of the plant is Siberia, where it is frozen each winter. When the thaw comes, it produces its leaves and stems

in a hurry, having stored up the energy within the crown during the previous summer. Unless it gets the cold spell it is indifferent about starting, whereas, if we dig up the crowns and let the late autumn frosts get at them, and then place them in warmth, the response is good.

Once a stock has been obtained, the grower can, if his garden is a good one, keep up the requisite number by dividing some of the lifted crowns into small pieces and replanting them elsewhere. If these are considered large enough a year later, they can be lifted for forcing, but most often, they must be left two years, without the removal of any of the stems in summer, in order to be large enough for this purpose.

Incidentally, those who are content to have outdoor forced rhubarb should place old pails or large pots, or boxes, over the crowns in the garden during early January. It is inadvisable to do that before Christmas, for nothing is gained that way. The outdoor crowns should be given the wintering first for as long as is possible. Our "outdoor beds" are divided into two parts. One part is covered one year and the other part in the following year. This gives each half a complete season in which to recover. Rhubarb beds subjected to this treatment and moderate pullings will last several seasons.

If manure and leaves are stacked around the inverted boxes and pots, the effect is one of hastening growth, but more important the rains of winter wash the

goodness out of the manure down into the soil where the rhubarb roots take full advantage of it.

One of the best varieties of rhubarb is known as The Sutton. It is of an intense colour and has a vigorous constitution. Challenge and Champion are excellent. We often see rhubarb seed offered and it is great fun seeing a small rhubarb plant grow from a miniature to a giant, but my experience is that a shilling spent upon one plant of a recognised variety is a wiser investment than a packet of seed.

Always remove seeding heads of rhubarb directly they are noticed.

Seakale

Seakale will respond to the same forcing conditions as rhubarb. Expensive crowns can be bought and treated in precisely the same way. There is a slight difference in the gathering. We pull the sticks of the rhubarb, which come in a steady succession, whereas the blanched rosette of seakale is cut off in one operation just below the tip of the crown.

As I have already stated, the "forcing crowns" are expensive to buy and they may seem hardly worth the crops that is reaped. Anyone fond of this luxury should learn how to cultivate the plant so that there is no expense whatever. Notwithstanding this lack of knowledge concerning the rearing of seakale, the fact is that the vegetable is a native plant. I have gathered much of it from a beach on the south coast of England

that was used by holiday-makers, who were content to pay high prices for it at the greengrocer's in the nearby town. The beach was pebbly and the large plants grew along the high tide boundary. I used to go along the beach with a rake and pull the pebbles over the heads of the leaves so that the main shoot was covered, and so became blanched.

It is well to understand a little about the plant in order to be able to cultivate it properly. The part we cut off and cook is really the stem that would become, if it were left, the seedhead. The difference between rhubarb and seekale is that in the latter we use the seedhead, and in the former we use the stems of the leaves. In the case of the seekale, it seldom grows vigorously after the seedhead has been allowed to develop, and it will, in the ordinary way, produce it quite young in life in a weak sort of way. But if we baulk it of its ambition by cutting the top of the crown off in early spring, it will increase its size below ground so that it can produce a still bigger top in the following season. The raisers who develop seekale to the "forcing crown" size know this and they cut off the crown every year until they consider the roots are large enough to sell for this special purpose. Sometimes it takes two years and sometimes three before the right size is obtained.

The large roots or "crowns," that resemble parsnips, actually have fairly large branching rootlets while in the ground and these are trimmed off before the main

roots are sold. These rootlets are known as thongs, and every piece will, if it is planted the right way up, eventually grow into another plant. It will take one or more years to do that, and it is the usual mode of propagation. When the fully developed plants are lifted, these thongs are trimmed up by the operator and cut in such a way that he makes no mistake which is the top and which is the bottom. We must remember that they must be planted the right way up, if they are to grow, and it is difficult to know which is the right end, once they are severed from the parent. However, it is usual to cut the uppermost straight across, and to cut the down-growing end obliquely. After they have been trimmed, the large roots for forcing are stored in a heap of ashes until they are wanted, while the thongs are buried in another heap of ashes until the spring. The main crop is generally harvested in the autumn. The crowns to be used for forcing are not trimmed off at the crown end, for we must remember that it is the seedhead that will be used when it grows in its warm home in the greenhouse.

In the spring, the thongs are taken from the ashes and planted the right way up in a rich, light, well-drained part of the garden. They are planted about 2 ft. apart in rows 30 in. apart, the tops of the thongs being buried about 1 in. below the surface. It may be when the thongs are taken from the ashes that they have already produced young shoots round the top of the top end. All these should be rubbed off, except

the strongest shoot, and the latter will develop into a nice strong head during the summer. If they have not produced new heads in the shoots, the thongs will produce them after they are planted, and it is a good rule to go round and pull out all but the strongest. In the following autumn, when the foliage has died down, they can be examined, and if the crowns are sizeable, they can be dug up and used for indoor forcing. But if they are not, they can be left in the ground for another year. If they are left without treatment, they would develop mediocre seedheads next season, so we either pare the tip of each crown off in the ground, or we can place pots and boxes over the roots and encourage them to produce a blanched seed-head outdoors—so to speak. When this is pared off, the root will at once begin to make another top and build itself up for the next season and will then be large enough for forcing. Therefore it is possible to get an outdoor forced crop before digging up the root and putting it in the greenhouse. Once it has been forced indoors, it is of little use. The outdoor forcing also weakens it to a certain extent and the professional seakale nurserymen pare their one-year-old plants before they begin to grow again, so that all goodness goes into future development—hence the high cost of production.

It is also possible to raise seakale from seed. It should be sown thinly in shallow drills during March, spacing rows about 1 ft. apart. These seedlings are

thinned to distances of 1 ft. directly they can be handled, and those that are left are allowed to grow unchecked for the first season. During the succeeding January—say—the seedlings should be dug up and replanted in another position. Before they are planted, the tips of the crowns must be pared off for reasons already stated. They should be planted again as though they were thongs and thereafter treated as though they had originated from thongs.

I hope that I have not made the cultivation of seakale sound too complicated. I have deliberately described the process lengthily, because I believe that it is a crop that would be more widely grown, if only the right methods were known and adopted.

CHICORY

Another native plant that is not widely grown because its cultivation is not generally known is chicory. There are two main types of it. One, in one catalogue is described as "Large Brussels," and the other is the "Barbe-de-Capucine," the latter being a smaller rooted sort. The last-named is the one we cultivate in order to have blanched stems during the New Year. These plants are raised by sowing the seeds in light, rich garden soil during May in shallow drills, spaced 1 ft. apart. The seedlings are thinned out (not transplanted) to 9 in. directly they are large enough. Nothing more is done beyond keeping them free from weeds, and the leaves will die down naturally

in the autumn. In December when the room is convenient, some of the roots are dug up from the garden and are planted in deepish boxes of soil, being placed a few inches apart. Care is taken to see that the tops of the roots are just above soil level. They are placed in a dark warm building and quickly send up blanched elongated rosettes of leaves that are pared off at the necks and taken to the kitchen.

Incidentally, many visitors have been interested in a charming blue flower that is a striking picture in summer, and they can hardly believe me when I tell them that it is chicory.

V. MIXED HOTBED CROPS

IN previous chapters we have seen that horse manure will generate heat that will help mushrooms, and we have seen that cucumbers will grow upon heaps of manure and leaves. Hotbeds prepared precisely in the same way as advocated for cucumbers will yield lettuces, turnips, carrots and radishes that are ready to eat several weeks before any outdoor crops of those vegetables are ready. We generally start hotbeds for this type of crop early in January. Directly the beds are built, the frames are placed in position and soil is placed in the frames. As has already been indicated in the chapter upon cucumbers, these crops prefer lightish soil, rather than the loamy compost prescribed for tomatoes and cucumbers. We usually use the old soil of the tomato beds that is cleared out of the greenhouse at that time of year. The tomato crop has extracted the heaviness of the soil, as it was originally, and it is just right for this fresh purpose. Furthermore, we are making additional use of the imported soil and we are doing two jobs at once. It is spread over the floor of the frame, which is now the top surface of the hotbed, to a depth of 4 in. and a few days are allowed for it to become warmed through.

A newly-made hotbed will often develop a very brisk heat for a week or so. This causes immature germination and the crop would not grow properly. Therefore, it is a wise precaution not to sow the sort of seeds we have in mind for at least ten days after the bed has been made and the soil has been put on.

If carrots are the favourites, a stump-rooted variety should be chosen for this job. Earliest French Horn is a useful standard type. Shallow drills are made at 6 in. intervals and the seed is sown shallowly along them. They are raked over and the glass lights put on so that hardly any air gets in or out. After germination is apparent, some ventilation is given by putting a block of wood under one end of the light. As the days lengthen and get warmer, more ventilation is given and, ultimately, the glass light is almost slid off the top. On the other hand, when a cold spell arrives, as it often does in February, the glass is covered with mats, or litter so that the cold is kept out. The bother with litter is that it is tiresome to remove daily, but it must be used if the proper coverings are unobtainable. The beds are watered if it is deemed necessary, but that should not be, in normal circumstances, because the manure keeps the soil moist. If it is necessary, it should be when the young roots are developing. Pulling should begin when the largest are about the size of an average thumb.

Lettuces are generally sown in a pan or box and are then transplanted while quite young, spacing them about 6 in. apart in all directions upon the hotbed surface. If no heated greenhouse is available in which they can be germinated in about three weeks, before the hotbed is ready for them, it is well to sow seeds in pans and place these upon the hotbed. They can be transplanted directly they are large enough to handle. Sow thinly in the seed-pans or they may "damp off." Ventilation and other details are the same as for carrots.

With ordinary care they will mature fairly quickly and alternate plants can be cleared while young to make room for the other half that will grow into large full-hearted plants. By the time that these are ready the weather will be warm enough for the glass lights to be kept off most of the time. The only trouble that is likely to appear is "damping off." All faded leaves and any that are attacked by mould should be religiously removed. Do not let the lettuce plants suffer from excessive moisture or excessive dryness at any time. Remember all the while that they must not be coddled and that they like as much air and light as possible, together with warmth and whatever sunshine is going.

Whether lettuces are to be raised and grown in the greenhouse, raised in the greenhouse and grown on the hotbed, or raised and grown in the hotbed, the best varieties are Cheshunt Early and Golden Ball.

The majority of ordinary varieties are unsuitable for this purpose.

Another crop for the hotbed is the common garden turnip. The varieties, White Milan, or Lily White, will grow amazingly quickly. Seeds may be sown in drills, as described for carrots, or they can be broadcast over the surface of the hotbed and raked in. In all other respects the treatment is the same as for forced carrots.

We generally have radishes to pull during February and March. A few seeds are scattered among the carrots and turnips at the same time the latter are sown. These germinate quickly, grow quickly, and the roots are removed before they stifle the main vegetables. Care must be taken to sow thinly, or they will do that very thing. Some gardeners allow them a frame to themselves and raise two or three successive crops rather than allow any chances of stifling to happen.

When we have cleared carrots, turnips, lettuces and radishes from hotbeds, the latter are used for a crop of vegetable marrows without any further preparation. Of course, the hotbeds are no longer hot, but the rotted manure and leaves is an excellent medium for the marrow roots to bore their way into.

During April, just when the forced crops are finishing (if the hotbed was made in the New Year), three or four marrow seeds are planted about $\frac{1}{2}$ in. deep fairly close together in the middle of the frame.

The light is placed in position and air is excluded until the seedlings appear. After that some ventilation is given by day, but the lights are put on at night while there is any danger of frosts arriving. We must remember that the slightest frost kills this vegetable. In late May, when the great danger is passed, the glass light is moved right away. A few weeks later the wooden wall of the frame is lifted off, thus allowing the plants to roam at will. The trailing varieties of Long Green and Long White will spread many yards and my plants always have a tendency to climb the north hedge that protects the frames from cold winds, although this hedge is 10 ft. high. These few plants yield hundreds of fruits, the latter being cut regularly when they are about 1 ft. long. The only routine treatment they get is a frequent watering with the hose-pipe. In the infant stage, when the main shoot is about 2 ft. long, the tip of the extreme growth is removed to make the main shoot develop sidegrowths. One other item is to pick an open male flower and dab its pollen across the female flower in order to bring about fertilisation and consequent fruiting. Once the habit of fruiting begins there is no need to continue with this performance.

Finally in the autumn, when the frosts have killed the marrow plants, the heap of rotted manure and leaves is wheeled on to the prospective onion bed, where its remnant of goodness is finally absorbed by

that crop. In this way, the hotbed site is cleared just in time to start the whole business all over again.

In this chapter and the previous one, some of the subjects have been dealt with somewhat peremptorily simply because any gardener with ordinary intelligence can grow these things without any more instruction. There are no snags if such attentions as watering, ventilation and protection from frosts are paid to them discriminately. There is no need to bother about fertilisers and diseases. Neither of those two things have time to have a beneficial or adverse effect upon the crops. We do get troubles, such as "damping off," and slugs and wood lice. The creeping things must be stopped, but once the fungoid bothers start, there is nothing gained by striving to bolster up a diseased crop. The only thing to do is to jettison the bad stuff and start again. Happily, or luckily, I have very rarely had to do that.

VI. CROPS STARTED INDOORS *

THIS chapter is really a footnote to the rest of the book. It does not deal with extraordinary foodcrops, neither does it concern indoor vegetables, but with very ordinary things that are brought to maturity earlier than usual through being given a protected start. This vital information can generally be found in expensive treatises upon these subjects, but is rarely given in articles or handy volumes.

The best *Onions* of the garden are raised by sowing seeds in boxes during January, germinating them in the greenhouse, transferring them to a cold frame until March or April, and then transplanting them in the garden during late April. The boxes should be at least 4 in. deep, and should have plenty of drainage; the soil should be light and sandy; the seeds should be sown very thinly and only just covered; water should be used sparingly and the plants should never be coddled. The whole object is to get seedlings that have plenty of long roots by the time they are ready for the garden. If the garden is rich they grow quickly and will develop into large healthy bulbs without any artificial feedings.

* The outdoor cultivation of these vegetables is dealt with in *Plain Vegetable Growing*.

There is a prevailing idea that large sound bulbs are got by dosing the bed with nitrogen. This is not so. People who cannot grow good large bulbs contend that the smaller ones are best, but they invariably choose the former when they are given the chance to buy either.

Brussel Sprouts that are sown in February give the best knobs. Deepish boxes are used, and directly germination is apparent, the boxes of seedlings are carried to a cold frame where they are allowed to get used to the conditions before they are transplanted from the seed-box to the floor of the frame. Some of the old tomato-bed soil is wheeled from the greenhouse and is spread over the floor of the frame. It is dusted with lime and watered. Directly it is dry enough to work upon, each seedling is taken from its box and is planted in the new bed firmly with a small peg. A pointed wooden peg is used to make the hole and to press the soil round the roots after insertion. These seedlings are spaced about 4 in. apart in all directions. Plenty of ventilation is given at all times, and in the spring the lights are removed on all occasions except exceptionally cold spells of weather. The whole object is to get sturdy plants that can be transplanted in the garden without trouble during late April and early May.

It is usual to sow early *Cauliflower* during October, transplant them into beds upon a frame floor and keep them growing steadily throughout the winter, only

to transplant them to the open garden in a protected position during May. If cauliflowers are coddled too much, they are inclined to make better leaves than roots, and when transplanted, they will produce tiny hearts instead of developing as they ought. They must always be given ventilation except when heavy frosts or snow makes protection necessary. It is also a good rule to sow more cauliflowers in early February and give them similar treatment to that meted out to Brussel sprouts.

If the autumn-sown *Cabbage* crop is a failure, a substitute is to sow seeds of a very early variety, such as *Velocity*, and treat the seedlings in the same way as we do early Brussel sprouts and cauliflowers.

Cabbage Lettuces of the All-the-Year-Round type can be sown and treated in the same way as the other crops at the same time. But it is far better to transplant some of the seedlings to the frame and let them mature there. The remainder should be transferred to a sheltered corner of the open garden. Such a procedure ensures a constant supply of lettuces from March till June, when the outdoor sown crops begin to arrive. The hotbed and greenhouse crops of the *Golden Ball* and *Cheshunt Early* varieties will "come in" first; the frame All-The-Year-Round will follow them, and the outdoor half of that sowing will fill the breach until the outdoor March sowings begin to mature in late June. Constant

outdoor sowings will then ensure a supply all through summer and autumn.

Leeks are very valuable vegetables. First sowings should be made indoors in early February and the seedlings transplanted to the garden during late spring. They need the same treatment as early onions. More leeks should be sown outdoors in March.

Celery is a tricky crop to grow. Seed should be sown in pans of soil during late February, mid-March and early April. The seedlings should be transplanted into the floor of a cold frame directly they are large enough. They may need a little more protection than the other subjects, but they should not be coddled. They will be ready to transplant in June into trenches. The chief mistakes that people make in the cultivation of this vegetable are keeping the roots too dry and sowing too early. If sown too early the plants run to seed. If allowed to get dry at the roots, the chances are that the stalks will become pithy.

One other crop that is raised indoors is the *Sugar Corn*. Seeds should be sown singly in small pots of light soil during May, and then be transplanted to the open garden without root disturbance during June.

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